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10/681,173	10/09/2003	Tetsuo Fujiwara	501.38204CC2	7884

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ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-9889

EXAMINER	
DICKEY, THOMAS L	

ART UNIT	PAPER NUMBER
2826	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/681,173	Applicant(s) FUJIWARA ET AL.	
	Examiner Thomas L Dickey	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 February 2004*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☒ Claim(s) *3 and 11* is/are allowed.
6)☒ Claim(s) *1,2,4-10 and 12-21* is/are rejected.
7)☒ Claim(s) *22* is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/09/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The preliminary amendment filed on 10/09/2003 has been entered.

2. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A. Takatani et al. 6,396,092 is a national stage English language version of Takatani et al. WO-9844551-A1. The WO patent is a 102(b) reference against the claims and thus has been cited in preference to 6,396,092, which is only a 102(e) reference against the claims.

B. Tang et al. 6,462,931 provides evidence that platinum, amongst others, inherently has the property of face-centered cubic crystallinity.

Oath/Declaration

3. The oath/declaration filed on 10/09/2003 is acceptable.

Drawings

4. The formal drawings filed on 10/09/2003 are acceptable.

Information Disclosure Statement

5. The Information Disclosure Statement filed on 10/09/2003 has been considered.

Claim Objections

6. Claims 14-19 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend on another multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims 14-19 have not been further treated on the merits.

7. Claim 13 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 12. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

A. Claims 4-10,20, and 21 are rejected under 35 U.S.C. § 102(b) as being anticipated by FUKUDA ET AL. (5,508,953).

Fukuda et al. discloses a ferroelectric capacitor, and a method of forming the same, wherein the ferroelectric capacitor includes a buffer layer 13 formed on a substrate 21, the method includes a step of forming a buffer layer 13 on a substrate 21, the ferroelectric capacitor includes a bottom electrode 16, the method includes a step of forming a bottom electrode 16 on said buffer layer 13,

the ferroelectric capacitor includes a ferroelectric thin film 17 (the buffer layer 13, bottom electrode 16, and ferroelectric thin film 17 being sequentially laminated)

the method includes a step of forming a ferroelectric thin film 17 on the bottom electrode 16, and the ferroelectric capacitor that is the product of Fukuda et al.'s method has a buffer layer 13 made of a transition metal (titanium, meeting an element of claims 5 and 21) or a nitride (TiN) thereof, a ferroelectric thin film 17 made of a perovskite-type oxide (PZT, that is, lead zirconium titanate) containing a metal element (either lead in the range of 0-50%, to meet a second element of claims 5 and 21, or the titanium found in the titanate of PZT), and a bottom electrode 16 containing an intermetallic compound composed of said metal element (lead or titanium) and a noble metal (platinum, the last requirement of claims 5 and 21).

With regard to claims 6 and 7 bottom electrode 16 is made of a substance composed of Pt and Pb in the range of 10 atom % to 50 atom %, and a $L1_2$ type crystal structure represented by the composition formula of Pt_3Pb. It should be noted that in the instant application on page 9, lines 4-12, applicant expressly admits that the difference in lattice constant between Pt_3Pb and PZT is inherently less than 1%. Thus any reference, such as Fukuda et al., which discloses the Pt_3Pb intermetallic compound of claims 6 and 7, inherently discloses the 1% lattice constant limitation of claim 12, if the reference discloses PZT for the perovskite-type oxide, as Fukuda et al. does.

With regard to claims 8-10 the intermetallic compound of the ferroelectric capacitor disclosed by Fukuda et al. comprises Pt (thus intrinsically having a crystal structure based on a face centered cubic lattice, note Tang et al. 6,462,931 column 3 line 10), as required by claims 8 and 9, and both the ferroelectric thin film 17 and the bottom electrode 16 of the ferroelectric capacitor disclosed by Fukuda et al. orient mainly in the (111) plane, (100) plane, or (110) plane, as required by claims 9 and 10.

Note figures 1,2, and especially 19, 20 (for the Pt_3Pb intermetallic compound of claims 6 and 7), and column 6 lines 12-35, column 8 lines 64-67, column 9 lines 1-5, and especially column 9 lines 9-12, this last disclosing a claimed feature not seen in the drawings (that the buffer layer 13 and bottom electrode 16 are sequentially laminated).

B. Claims 1,2,6,7, and 12 are rejected under 35 U.S.C. § 102(b) as being anticipated by TAKATANI ET AL. (WO-9844551-A1). Claim 13, being a word-for word duplicate of claim 12, is rejected as being anticipated by Takatani et al. for the same reason claim 12 is rejected.

Takatani et al. discloses a ferroelectric capacitor of the type having a top electrode 104, a ferroelectric thin film 103, and a bottom electrode 102, characterized in that said ferroelectric thin film 103 is a perovskite-type oxide (PZT) containing lead, a metal element, wherein said top electrode 104 contains an intermetallic compound composed of lead, the metal element referred to above and platinum, a noble metal, and with reference to claim 2, said bottom electrode 102 contains the same intermetallic compound composed of lead and platinum, and the Pb is in the range of 10 atom %, with the result that said ferroelectric thin film 103 is made of a perovskite-type oxide (PZT) containing a metal element and said top electrode 104 is made of a substance composed of Pt and Pb in the range of 10-50 atom %, and said intermetallic compound is one which has a $L1_2$ type crystal structure represented by the composition formula of Pt_3Pb. It should be noted that in the instant application on page 9, lines 4-12, applicant expressly admits that the difference in lattice constant between Pt_3Pb and PZT is inherently less than 1%. Thus any reference, such as Takatini et al., which discloses the Pt_3Pb intermetallic compound of claims 6 and 7, inherently discloses the 1% lattice constant limitation of claim 12, if the reference discloses PZT for the perovskite-type oxide (PZT), as Takatini et al. does. Note figures 4 and 14-16, and table 2 of Takatini et al. Applicant's attention is also directed to the translation of Takatini et al. which published some time later as U.S. Patent No. 6,396,092. In the translation, relevant passages may be found at column 4 lines 63-67, column 5 lines 7-13, (note the translation of table 2 found following line 13), column 6 lines 48-63, and column 11 lines 10-65. Please also note that the captions of figures 4 and 14-16 are found translated into English in the '092 publication.

Allowable Subject Matter

9. Claims 3 and 11 are allowed over the references of record because none of these references disclosed or can be combined to yield the claimed invention such as a ferroelectric capacitor having a top electrode, a ferroelectric thin film, and a bottom electrode, characterized in that said ferroelectric thin film is a perovskite-type oxide, wherein:

A. said top electrode contains an **intermetallic compound** composed of one of the metal elements found in the perovskite type oxide and a noble metal and has a multilayer structure formed by **sequentially laminating** a layer containing an **intermetallic compound** composed of said metal element and a noble metal and a layer of said noble metal, the **intermetallic compound** being **adjacent** to the interface of the ferroelectric thin film, as recited in claim 3, or

B. said bottom electrode is of double layer structure composed of a first layer of metal having a face centered cubic lattice and a second layer of an alloy containing said metal, and the difference in **lattice constant** between the first layer of the bottom electrode and the second layer of the bottom electrode is 3.5% or less, as recited in claim 11.

10. Claim 22 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas L Dickey whose telephone number is 571-272-1913. The examiner can normally be reached on Monday-Thursday 8-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TLD
04/04

Minhloan Tran
Primary Examiner
Art Unit 2826